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**Climate Change,
Agriculture and
Food Security**



Climate Services for Agriculture: Empowering Farmers to Manage Risk and Adapt to a Changing Climate in Rwanda

**Annual Progress Report
October 1, 2016 – September 30, 2017**

**Quarterly Progress Report
July – September 2017**



RAB
Rwanda Agriculture Board



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Acronyms

Agri-TAF	Agriculture Technical Assistance Facility
AICP	Agriculture Information and Communication Program
CCAFS	CGIAR research program on Climate Change, Agriculture and Food Security
CCD	Cold Cloud Duration
CDT	Climate Data Tools
CIAT	International Center for Tropical Agriculture
CPT	Climate Predictability Tool
DERN	Development Rural du Nord
ENACTS	Enhancing National Climate Services initiative
ENSO	El Niño Southern Oscillation
GFCS	Global Framework for Climate Services
ICPAC	IGAD Climate Prediction and Application Centre
ICRAF	World Forestry Center
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
IOD	Indian Ocean Dipole
IRI	International Research Institute for Climate and Society
MINAGRI	Ministry of Agriculture and Animal Resources
NCFS	National Framework for Climate Services
PICSA	Participatory Integrated Climate Services in Agriculture
PASP	Post-Harvest and Agribusiness Support
PSDAG	Rwanda Private Sector Driven Agriculture Growth
RAB	Rwanda Agriculture Board
RCSA	Rwanda Climate Services for Agriculture
WMO	World Meteorological Organization

Summary of Annual Accomplishments

The second project year saw significant achievements. The training for the Participatory Integrated Climate Services Approach (PICSA) has been implemented in 10 districts. Through the process of partnership and PICSA trainings through the Twigire Muhinzi system, approximately 52,776 people were trained. The project collaborated with local NGOs, government institutions, and Information and Communication Technologies (ICT) and other communication companies to expand climate services to a wider number of beneficiaries. The Rwanda Climate Services for Agriculture (RCSA) project is partnering with the IFAD-funded Climate Resilient and Post-Harvest Agribusiness Support Project (PASP) project, led by the Ministry of Agriculture and Animal Resources (MINAGRI), to extend PICSA to cooperatives. PICSA monitoring in year one (September-December 2016 season) showed that 83% of trained farmers were able to share the climate services information with an average of 14 peer farmers outside their households. This suggests (with the optimistic assumption of no overlap in farmer-to-farmer communication networks) that elements of PICSA could have reached as many as 630,000 farmers. The project advanced work with partners on the use of ICT tools to communicate climate information. Through Radio Huguka, weather information is broadcast every six hours, and weather and climate radio talks, which are an hour long, are aired three times per week. These programs have created a new platform for experts from Meteo Rwanda and other institutions to explain the role of weather and climate services in agriculture.

A number of new climate information products have been added to the Meteo Rwanda Maproom. The [Agriculture Maproom](#) now includes analysis of historical rainfall onset and cessation dates, length of the rainy season, and daily rainfall statistics such as probabilities of dry and wet spells and probability of rainfall intensity. A flexible interface that allows users to specify thresholds (e.g., what constitutes a dry or wet spell, rain required for germination, soil dryness to end the growing season) allows technical users, particularly in Rwandan government agencies, to define what type of climate risks they look and how they define the start and end dates for growing seasons. The Agriculture Maproom also includes a prototype Historical Water Balance for one crop and planting date. This maproom is intended to be the basis for an agricultural drought risk analysis and early warning system, and also support analysis of the start and end of the growing season. The [Flexible Seasonal Forecast Maproom](#) – the first of its kind in Africa – has revolutionized the way in which seasonal forecasts are presented. The map view allows users to choose their own thresholds as either rainfall amounts or percentiles – a great improvement over the current tercile based forecast maps. Users can access the full forecast probability distribution, displayed with the historic distribution, for any of several agriculturally relevant variables, at any 4 km ENACTS grid cell. The new seasonal rainfall forecast was issued for the March-May and September-December 2017 seasons. Training in the interpretation and use of the new forecast format has been incorporated into PICSA training.

Several channels are being used to increase awareness and capacity to use the Maprooms, including: integration with the PICSA process, and showcasing them at national and international meetings (more information provided in the report). There are plans for a high-profile launch of the expanded suite of Maproom products, once ongoing improvements (improved graph formatting, Google Maps integration, Water Balance functioning with calibrated soil database) are complete. Rwanda's Maprooms are being adapted and extended regionally through ICPAC, under the Climate Services for Africa project supported by USAID-ARF

Training activities continue to enhance Meteo Rwanda's capacity to provide innovative climate information services. The main training effort is the Masters of Science scholarships for Meteo Rwanda staff. The seven individuals who were selected (an increase from the three originally planned) have begun their studies in different universities in the region. In addition, short training sessions for Meteo Rwanda covered the latest version of the Climate Data Tools (CDT), training to build capacity for "in house" climate services provision with junior Meteo Rwanda staff, and training on development and use of growing season onset and downscaled Flexible Seasonal Forecast Maprooms.

Another notable achievement in this period was initiating the process to develop the National Framework for Climate Services with the Government of Rwanda and the World Meteorological Organization (WMO).

Executive Summary of Quarterly Progress: July – September 2017

Outcome 1: Climate Services for Farmers. The project made significant progress in scaling up face-to-face delivery of climate services through the PICSA (Participatory Integrated Climate Services for Agriculture) process. Training-of-trainers extended expertise in PICSA to four NGOs (Developpement Rural du Nord [DERN], Caritas Kibuye, CARITAS Kibungo, CARITAS Butare), ten district agronomists, 3 communication institutions (Agriculture Information and Communication Program - Ministry of Agriculture and Animal Resources, Radio Huguka and N-Frnds) and one existing project (the IFAD-funded Climate Resilient and Post-Harvest Agribusiness Support Project [PASP]). Collaboration with the IFAD-funded PASP project enabled the RCSA project to reach farmers through 16 cooperatives from 4 pilot districts (Ngoma, Nyanza, Rubavu and Gatsibo). The project trained 48 cooperative members in the PICSA approach who then trained 932 member farmers. In total, RCSA trained 52,776 (where 42% are females) (51,113 farmers, 486 farmer promoters, 40 farmer field school facilitators, 100 Social Economic Development Officers, 50 sector Agronomists, 7 District Agronomists, and 48 farmer representatives of 16 cooperatives who, in turn, trained 932 farmers in the 16 cooperatives).

The project is working with partners to develop a protocol for Climate Field Schools, adapting and incorporating climate services into the existing Twigire Muhinzi Farmer Field School (FFS) model. FFS Facilitators and Farmer Promoters will establish demonstration plots to share, demonstrate and evaluate crop management options for using climate information to manage risk.

Project staff from Meteo Rwanda, the Rwanda Agricultural Board (RAB) and International Center for Tropical Agriculture (CIAT) delivered downscaled seasonal forecasts (September-December) to 14 districts (Kayonza, Nyanza, Burera, Ngororero, Kirehe, Bugesera, Gakenke, Rubavu, Musanze, Nyabihu, Nyamagabe, Nyaruguru, Nyamasheke and Karongi). The innovative, gridded, probabilistic forecasts, developed by Meteo Rwanda through the project, provided information on total rainfall, rainfall frequency, and the start and length of the rainfed growing season. The forecasts for total rainfall are displayed in the Maproom portal, and the other variables will also soon be included.

Progress on media- and ICT-based climate service communication channels included live, interactive talk shows on Radio Huguka (with Meteo Rwanda and RAB). A mobile-based survey is being prepared through the N-Frnds communication company to capture farmers' use of climate services and their opinions about the channels to communicate. The project initiated planning with Voto-Viamo to use their USSD codes, toll free lines and SMS to provide climate information to any MTN (national telecommunication company) registered phone user in project intervention areas, free of charge. Implementation of these activities has not started yet. Voto-Viamo is a social enterprise created by VOTO Mobile that uses simple, low-cost technology for data collection and to provide public service information via mobile phones.

Outcome 2: Climate Services for Government and Institutions. The project team developed and tested an institutional needs assessment and baseline analysis tool, and conducted the institutional baseline survey with 20 institutions. Work on developing an agricultural drought risk analysis and early warning system for the Government of Rwanda, based on soil water balance modeling, focused on the laboratory analysis needed to develop a calibrated, gridded national soil database (through RAB).

Outcome 3: Climate Information Provision. The project made substantial progress in the development of climate information products and tools during the fourth quarter. An intermediate Version 4 gridded

rainfall and temperature dataset was developed, using improved merging methods and calibration. Once completed, a verification analysis of the gridded data, initiated during the quarter, will be used to make final improvements to Meteo Rwanda's merged datasets. The project developed tools within the Climate Data Tools (CDT) for quality control, aggregation and use of Automatic Weather Station (AWS) data; and began work to help Meteo Rwanda apply these methods to data from its AWS network. Work also started to help Meteo Rwanda make better use of its Doppler radar data. Work to improve and operationalize seasonal forecast methods continued, including expanding the forecast variables for the September-December 2017 season to include seasonal total rainfall, rainy day frequency and season onset date. Meteo Rwanda's Agriculture Maproom was expanded to include cessation and length of the rainfed growing season, and total rainfall between the dynamic season onset and cessation. A prototype Historical Water Balance, which when complete will provide agricultural drought risk analysis and early warning, was developed for a single crop and planting date.

IRI experts led two training programs for Meteo Rwanda staff during the reporting period. A two-week training program (August 14 – September 1) focused on new features of the IRI's Climate Data Tool (CDT) for data manipulation, analysis, quality control and merging; and automated quality control and merging of data from Meteo Rwanda's automated weather station (AWS) network. An intensive two-week training (August 26 – September 18), which aimed to build capacity of junior Meteo Rwanda staff for "in house" use of climate services, included the Climate Predictability Tool (CPT), Data Library, Meteo Rwanda Maprooms, and prediction methods at sub-seasonal to seasonal time scales.

The research collaboration between IRI and Meteo Rwanda staff continued around the influence of the El Niño Southern Oscillation (ENSO), Indian Ocean Dipole (IOD) and wind dynamics on rainfall and temperature; and around seasonal prediction of agriculturally relevant derived seasonal climate statistics. Outputs under development include a joint presentation at the upcoming American Meteorological Society conference, and two peer-reviewed journal manuscripts.

Outcome 4: Climate Services Governance. Plans are advancing to work with the WMO Global Framework for Climate Services (GFCS) to support the development of a National Framework for Climate Services (NFCS) and associated Action Plan. The NFCS stakeholder consultation workshop, initially scheduled for early September, was rescheduled for December out of concern that changes in the government shortly after a presidential election might disrupt the process. The WMO agreed to finance a consultant to lead the process, with RCSA facilitating and financing the workshop. In support of this RCSA initiative, the Meteo Rwanda Board of Directors recommended that the Ministry of Natural Resources endorse the National Framework for Climate Services as a statutory organ at the highest level.

RCSA partners discussed examples of challenges of climate services use and governance, and explored the value of open climate data policies in the Rwandan context, in two sessions of the Africa Open Data Conference in Accra, Ghana. One session explored the value of open climate data policies, the other session addressed the way forward for open data relative to climate services.

Crosscutting Issues. The project has been receiving attention at a number of international and national forums, including: the Africa Open Data Conference in Accra, Ghana, the International Conference on Agro-meteorology in Addis Ababa, Ethiopia, Existing and New Tools for Drought Monitoring, in Zanzibar, Tanzania, and the University of Rwanda Scientific Conference Week 2017. It continues to leverage activities of different projects that have overlapping activities, including: the CCAFS-led

Climate Services for Africa (CSA) project, funded by USAID-ARF, the USAID-funded CISRI project, and the IFAD-funded Climate Resilient and Post-Harvest Agribusiness Support Project (PASP) project led by MINAGRI. The project will also be collaborating with the WMO to develop the National Framework for Climate Services.

Progress during the quarterly reporting period: July – September, 2017

Outcome 1: Climate Services for Farmers

In total, RCSA has trained 52,776 (51,113 farmers, 486 farmer promoters, 40 farmer field school facilitators, 100 Social Economic Development Officers, 50 sector Agronomists, 7 District Agronomists, 48 farmer representatives of 16 cooperatives who, in turn, trained 932 farmers in the 16 cooperatives).

The RCSA project facilitated the training of participants from four NGOs (Developpement Rural du Nord [DERN], Caritas Kibuye, Caritas Kibungo, Caritas Butare), ten district agronomists, 3 communication institutions (Agriculture Information and Communication Program - Ministry of Agriculture and Animal Resources, Radio Huguka and N-Frnds) and one existing project (the IFAD-funded Climate Resilient and Post-Harvest Agribusiness Support Project (PASP) on PICSA. The RCSA project provided training materials, including the PICSA manual in the local language, to all partners to be able to conduct PICSA rollout in their respective districts.

In addition to the Twigire Muhinzi model used by the project, cooperatives have been used to increase the dissemination of climate services to reach more farmers. This was achieved through collaboration with the IFAD-funded PASP project. Through CIAT, the project has pre-financed a training of 16 PASP-selected cooperatives from 4 districts (Ngoma, Nyanza, Rubavu and Gatsibo) as pilot districts. Through the training of trainers approach, 48 cooperative members were trained who later trained 932 fellow cooperative members before the 2018A agriculture season started.

Follow up and supervision plans from the project were prepared and implemented in collaboration with RAB and Meteo Rwanda.

As a follow up to the PICSA trainings, in collaboration with partners, the project is developing and applying a field protocol in Twigire Muhinzi villages known as Climate Field Schools (CFS). The protocol is being applied through the National Twigire Muhinzi model where Farmer Field School (FFS) facilitators and farmer promoters have established demonstration plots to evaluate different crop management options for climate change/variability adaptation and coping. The demonstration plots serve as schools for farmers where they come and learn technologies for improved agriculture. The plots will showcase the required inputs and best practices as per the PICSA guidelines. This will help evaluate the impacts of PICSA and provide evidences to verify and validate the seasonal forecast.

Strengthen capacity and incorporate user feedback on climate information services in 4 Year-1 pilot districts (Kayonza, Nyanza, Burera and Ngororero). Communication of the September/October/November/December 2017 seasonal forecast was done by CIAT, Meteo Rwanda and RAB staff in 14 districts. These included Kayonza, Nyanza, Burera and Ngororero, the year 1 pilot districts and Kirehe, Bugesera, Gakenke, Rubavu, Musanze, Nyabihu, Nyamagabe, Nyaruguru, Nyamasheke and Karongi districts for year 2. The following forecast information was communicated to farmers: Onsets and cessations of the season, length of the season, wet and dry spells and the total rainfall.

During the seasonal forecast communication meetings, the RCSA project team explained the implication of the forecast and through participatory activities and discussions, farmers chose suitable crops for the season and set out strategies, such as mulching, use of fertilizers, planting on time, and irrigation, to be able to increase yields.

Work with partners to develop, implement and assess a new ICT or media-based climate service communication tool (e.g., interactive climate service radio programming, climate information call center) for farmers. In partnership with Meteo Rwanda and RAB, the RCSA project team conducted live talk shows on Radio Huguka on integrating climate services in agriculture. During the shows, farmers had the opportunity to call in and ask questions related to climate and planting seasons. The questions were answered by experts during the program.

CIAT also works in partnership with Meteo Rwanda and N-Frnds. Through this collaboration, N-Frnds registers project beneficiaries' phone numbers in the cloud system to facilitate access to climate and weather information daily. A mobile based survey is being prepared through N-Frnds to capture the farmers' use of climate services and their preferences regarding the different communication channels.

In addition to N-Frnds, the project has initiated contact with Voto-Viamo, which has an agreement with the national MTN telecommunication company. This is a mobile cloud based company that uses USSD codes, toll free lines and short messages to disseminate information to all MTN registered phone numbers. Through this partnership, farmers (from the project's intervention areas) will get climate services information free of charge using their mobile phones. The full possibilities of the partnership with this company are still in the early stages.

Incorporate probability-of-exceedance products and probabilistic analysis of decision-relevant thresholds (e.g., probability of sufficient season length for a given cultivar) into the PICSA process and training materials. During the PICSA training of trainers, probability of exceedance graphs were used to work out probabilities of having a given amount of rainfall, having rain starting on a given date, etc. in specific locations. The PICSA manual is still being adjusted to the Rwandan context and the probability of exceedance graphs should be incorporated in the final version of the PICSA Kinyarwanda-language manual.

Outcome 2: Climate Services for Government and Institutions

Institutional Baseline Study. The RCSA project team has developed, tested and finalized the institutions' needs assessment tool. The institutional baseline survey was successfully conducted in 20 institutions. The survey database and a draft report are available. The final report for this will be submitted for publication in the next reporting period.

Develop and test a water balance-based tool for early assessment of drought impacts on food production and food security. Following analyses that suggested that the existing SoilGrids Africa-wide soil database does not adequately represent measured soil properties in Rwanda, the project team began working with RAB to develop a gridded national soil database for the soil water balance tool and other applications. Laboratory analysis is complete for a number of soil properties: total and mineral N, organic C, available and total P, exchangeable cations (Ca^+ , Mg^+ , K^+), S, soil pH (pH_w and pH_{KCl}), CEC, texture, bulk density, total porosity, and available water content. Water holding capacity analysis is ongoing.

Outcome 3: Climate Information Provision

Training and education to build capacity of Meteo Rwanda to provide innovative climate services based on user feedback. An IRI expert traveled to Rwanda from August 14-September 1, 2017 to train Meteo

Rwanda staff on IRI's Climate Data Tools (CDT) required for generation and use of the ENACTS datasets. Although staff had previously been trained on this topic via earlier projects, this training featured recently developed new methods and tools. The workshop provided new staff with this training for the first time, and it also served as a refresher for existing staff. The training included an introduction to CDT, data manipulation, data analysis, quality control and merging data. Additionally, automated quality control procedures were implemented to ensure the accuracy of the Meteo Rwanda's Automatic Weather Station (AWS) network, and a data processing script was developed to integrate these data into ENACTS datasets. IRI provided technical support for the training by setting up a group login account for access to the ENACTS data on the Rwanda server. IRI also helped recover the ENACTS server after a reboot of the system caused the system to be offline.

An intensive two-week training to build capacity for "in house" climate services provision was conducted with junior Meteo Rwanda staff from August 26 to September 18, 2017. Training topics included the Climate Predictability Tool (CPT), the IRI Data Library, Meteo Rwanda Maprooms, as well as background on meteorology and seasonal-subseasonal time scales. Group exercises were developed and used to evaluate participant understanding of the training topics, including data extraction, forecast development and forecast verification. The Water Balance Maprooms were also discussed with the Meteo Rwanda trainings participants and officials from the Rwanda Agriculture Board.

Refining gridded climate data products at Meteo Rwanda. Work has continued on improving the gridded rainfall and temperature datasets. An intermediate Version 4 was generated by IRI, and the final version will be made available next quarter. Work has started to help Meteo Rwanda with organizing, correcting and using observations from the AWS. IRI has developed tools for quality-control, aggregation and use of AWS data. Work has also started to help Meteo Rwanda with organizing, correcting and using its Radar data.

Develop different forecast products. Work this quarter continued to improve and operationalize the current seasonal forecast approach. The IRI staff visit to Rwanda in August included contributions to forecast development for the September October November December (SOND) 2017 season, including seasonal total rainfall, rainy day frequency and onset date forecasts.

Develop climate service products and tools based on user and Meteo Rwanda demands in collaboration with project partners. This quarter, the Agriculture and Forecast Maproom was further expanded. An updated soil-plant-water balance function that accepts gridded soil information, allowing use of [SoilGrids](#), a publicly available gridded soil database for Africa, was completed this quarter. A prototype Historical Water Balance Maproom was developed to demonstrate one crop and planting date. The prototype allows exploration of year-to-year variability of variables that are more relevant than rainfall to farming, such as evapotranspiration or water stress. Additionally, a prototype Maproom was developed for cessation date and length of the rainy season and will contribute to further tailoring of climate information to agriculture. All of this historical data will also serve as the basis to test and train seasonal forecasts of those same quantities. IRI helped Meteo Rwanda staff to resume updating the ENACTS ten-day rainfall monitoring product.

Conduct operation research to improve understanding Rwanda's climate and its forecasting. The research collaboration between IRI and Meteo Rwanda staff continued towards building in house seasonal prediction capability and developing original findings for peer-reviewed publication. Work towards a

manuscript on the Rwanda climatology for a peer-reviewed publication continued. It is expected the paper will be submitted for publication next quarter.

Research regarding the influence of ENSO, IOD and wind dynamics on rainfall and temperature over Rwanda continues and is being prepared for presentation at the upcoming American Meteorological Society conference. Submission to a peer-reviewed journal is expected to take place in the first half of 2018.

There was a challenge to automate/connect the AWS, radar and the maproom as planned. As a result, these two products – observations from the AWS stations and the Doppler radar - cannot yet be displayed on television screens in all government institutions as anticipated.

Develop different forecast products. The developed seasonal forecast was disseminated to end-users including the project's trained audience and their neighbors who were able to attend the event by Meteo Rwanda, RAB and CIAT. The Maproom has been adapted to user demands and this information is freely available via the Meteo Rwanda website. The interpretation and use of the new seasonal forecast products has been incorporated into PICSA training. This information will soon be downscaled to sector levels where people can access it via television.

Outcome 4: Climate Services Governance

An action plan for the National Framework for Climate Services is in the process of being developed. This process will be led by WMO-GFCS staff, and supported by a consultant funded by the WMO. A NFCS workshop is also being organized and is being facilitated and funded by the RCSA project. The workshop will be held during the first week of December.

As a support to the RCSA project initiatives, the board of directors of Meteo Rwanda has recommended the endorsement of the line Ministry for the establishment and awareness raising of the National Framework for Climate Services as a statutory organ at the highest level possible. In this regard, Meteo Rwanda will develop a concept note and steer the full technical development process.

Further progress was made on the governance structure paper during two sessions co-organized at the Africa Open Data Conference in Accra, Ghana. One session explored the value of open data relative to climate service, while the other session addressed the way forward for open data relative to climate services. Sector-specific examples of challenges of climate services use and governance were presented at both sessions. This will directly tie into one of the elements of the governance structure paper that explores the influence of the private sector on governance structures of climate services.

Cross Cutting Issues

Project Management and Administration

The team engages in regular calls regarding project management.

The RCSA project hosted a research team from the USAID-funded Climate Information Services Research Initiative (CISRI) project to assess livelihoods decisions and where climate information fits into those decisions. This research is complementary to RCSA project's deliverables.

The project offered 8 professional internships to recent graduates with B.A. degrees in agriculture and environmental studies. They are supporting the project in the roll out of PICSAs trainings and supervision of FPs trainings to farmers; and several aspects of the project.

The partnership process between RCSA project (through CIAT) and PASP is still ongoing; in the meantime, initial training has been pre-financed by RCSA project.

After the close of the GHACOF regional meeting in Zanzibar, Tanzania, a three-day workshop entitled “ICPAC and National Climate Maprooms – Existing and New Tools for Drought Monitoring and Forecasting in Eastern Africa” was held from August 23-25th 2017. The RCSA project team was represented by Ms. Gloriose Nsengiyumva (CIAT Rwanda) and Mr. Aimable Gahigi (Rwanda Agriculture Board). Ms. Nsengiyumva presented on some of the tools being used in Rwanda regarding PICSAs; other presentations also highlighted work in Rwanda being funded by this project, specifically on the Agriculture Maprooms and ENACTS Rwanda.

Project Outputs

Climate information, tool and capacity development

- An updated soil-plant-water balance function that accepts gridded soil information was completed this quarter.
http://iridl.ldeo.columbia.edu/dochelp/Documentation/details/index.html?func=:Water_Balance
- A prototype Historical Water Balance was developed to demonstrate one crop and planting date.
http://maproom.meteorwanda.gov.rw/maproom/Agriculture/Histo_Agri/WB_BB_SOND.html
- An authorization system was installed to enable Meteo Rwanda to share its ENACTS datasets with different users, particularly government ministries.

Reports and publications

- Clarkson G, Dorward P, Kagabo D, Nsengiyumva G. 2017. Climate Services for Agriculture in Rwanda: Initial findings from PICSAs monitoring and evaluation. CCAFS InfoNote. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available at <http://hdl.handle.net/10568/89122>.
- Coulibaly JY, Birachi EA, Kagabo DM, Mutua M. 2017. Climate services for agriculture in Rwanda: Baseline survey report. CCAFS Working Paper no. 202. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available at <http://hdl.handle.net/10568/80820>
- Coulibaly JY, Birachi EA, Kagabo DM, Mutua M. Hansen, J. 2017. Climate services for agriculture in Rwanda: What farmers know about climate information services in Rwanda. CCAFS InfoNote. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available at <https://cgspace.cgiar.org/rest/bitstreams/119968/retrieve>
- Faniriantsoa R. 2017. Training program on Climate Data Tools, and development of a method for integrating Automatic Weather Station and radar data into the ENACTS datasets. CCAFS Workshop

Report. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security. Available at <http://hdl.handle.net/10568/89123>.

- Siebert A. 2017. Training program on seasonal forecasting at Meteo Rwanda using the Climate Predictability Tool and the IRI Data Library. CCAFS Workshop Report. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security. Available at <http://hdl.handle.net/10568/89105>.

Communication and engagement

Five blog stories documenting workshops and field training events were published on the CCAFS website. There have been other social media outputs as well.

- News blog: CCAFS showcases its Maproom project at the University of Rwanda Scientific Conference Week 2017 - <https://ccafs.cgiar.org/news/ccafs-showcases-its-maproom-project-university-rwanda-scientific-conference-week-2017#.We8wbROCzXR>
- News blog: Could this be the game changer in climate information services innovation? - <https://ccafs.cgiar.org/blog/could-be-game-changer-climate-information-services-innovation#.We8wgROCzXS>
- News blog: PICSA training of trainers: strengthening national and local capacity for climate services for agriculture in Rwanda - <https://ccafs.cgiar.org/blog/picsa-training-trainers-strengthening-national-and-local-capacity-climate-services-agriculture#.We8wkxOCzXR>
- News blog: Establishing the foundation for climate services in Rwanda - <https://ccafs.cgiar.org/blog/establishing-foundation-climate-services-rwanda#.We8wqxOCzXR>
- News blog: Collecting farmers' feedback on climate information services in Rwanda - <https://ccafs.cgiar.org/blog/collecting-farmers%E2%80%99-feedback-climate-information-services-rwanda#.We8wvxOCzXR>
- CCAFS East Africa Newsletter story: Delivering targeted climate information services and products for farmers in Rwanda - <https://cgspace.cgiar.org/rest/bitstreams/119116/retrieve>
- Twitter: RCSAgriculture @RwandaCSA link <https://twitter.com/RwandaCSA>
- Facebook: <http://bit.ly/2yjkLzp>
- Booth at the University of Rwanda Scientific Conference Week 2017 - Rebranding Research for Sustainable Development.
- Publicity and outreach materials for the project were disseminated. These include T-shirts, flash disks, pens, caps, notebooks and folders.
- Photo set: Participatory Integrated Climate Services for Agriculture (PICSA) training sessions - <http://bit.ly/2zrTuZV>

- Photo set: Visit by USAID-Rwanda team to the four pilot districts where the Rwanda Climate Services for Agriculture Project has been launched on 21 – 23 March 2017 - <http://bit.ly/2wQHCPy>
- Photo set: Project implementation partners met on March 6-7 in Kigali to plan for 2017 - <http://bit.ly/2z0OIH6>
- Photo set: Exhibition showing how the maprooms developed by the Enhancing National Climate Services initiative (ENACTS) have filled the 15-year gap (1994-2009) in Rwanda's historical meteorological records - <http://bit.ly/2ybEXDM>

Conference presentations

- The boosting role of a decentralized agricultural extension model in the provision of weather and climate information services. Dr. Desire Kagabo. International Conference on Agro-meteorology, Addis Ababa, Ethiopia from 3-4 July 2017.
- Dr. Desire Kagabo participated in conference on climate services for agriculture, held in Ethiopia, and made a presentation on the dissemination of climate services and the decentralized agriculture extension model. A paper will be published as part of the conference proceedings.
- Dr. Desire Kagabo attended the Africa Open Data Conference in Accra, Ghana, where he presented a sector-specific example from Rwanda on challenges of climate services use and governance, and how Rwanda is shifting towards an open climate and weather data policy.
- Ms. Gloriose Nsengiyumva presented at ICPAC and National Climate Maprooms – Existing and New Tools for Drought Monitoring, held in Zanzibar, Tanzania.

Challenges and Corrective Actions

The full use of Maprooms for generating PICSAs is essential to the project's strategy for scaling and sustaining climate services. However, the formatting of the current Maproom graphs is not well suited for the workshop-based PICSAs process. IRI initiated plans to enhance both the maps and the x-y graphs in the Data Library platform. The enhanced graphics are expected to be operational in Meteo Rwanda's Maprooms in the first quarter of 2018.

Delays in validation of historical gridded climate information and preliminary evidence of inconsistencies with station data in Eastern Rwanda are a more serious concern. The roll-out of PICSAs proceeded, but with uncertainties about the quality of the merged data. An evaluation of the merged data, initiated during the reporting period, is complicated by the fact that all long-term station data sets that passed initial quality control are already incorporated into the merged data set. The quality of available independent station data sets still needs to be verified in order to determine whether inconsistencies reflect weakness in the merged data or in the selected stations.

Technical challenges delayed plans to integrate AWS and Doppler radar data into Meteo Rwanda Maprooms until the next quarter.

On October 3, USAID notified CCAFS that the project would not receive the final \$1M. During the next quarter, the project strategy, project and partner budgets, and targets will be adjusted for the 20% overall budget reduction, informed by contingency plans that were drafted earlier in the year.

Planned Activities for the Next Reporting Period

Project Management and Administration

- Project calls that will reach broadly to all project partners
- Discussions and planning on communications strategy with ILRI
- Timeline for training planned in January/February

Outcome 1: Climate Services for Farmers

Complete design phase and baseline data collection to identify priority information products and communication strategies to reach farmers

- Finalize cleaning and preliminary analysis of the data collected during the evaluation survey
- Prepare tools for monitoring activities of the second year of the project.

Activity 2018 1.3.1 – Work with partners to develop, implement and assess a new ICT or media-based climate service communication tool (e.g., interactive climate service radio programming, climate information call center) for farmers.

- Talks shows, debates, live shows about climate services will be conducted through our partner communication companies.

Activity 2018 1.3.2 – Incorporate probability-of-exceedance products and probabilistic analysis of decision-relevant thresholds (e.g., probability of sufficient season length for a given cultivar) into PICA process and training materials.

- PICA materials such as climate services graphs will be developed to be used starting from January 2018

Outcome 2: Climate Services for Government and Institutions

Activity 2018 2.1.1 – Institutional climate services information study completed

- A report from the institutional climate services study will be finalized, published and uploaded on the CCAFS website.

Activity 2018 2.2.1 – Develop and test a water balance-based tool for early assessment of drought impacts on food production and food security

- Pending tests will be finalized and final results on Rwanda soil status to be included in the water balance

Outcome 3: Climate Information Provision

Activity 3.1 – Training and education to build capacity of Meteo Rwanda to provide innovative climate services based on user feedback

- The two-week training on satellite and radar meteorology originally planned for August/September is postponed to the next quarter. This was because this training was replaced by a more urgently needed training described earlier.

Activity 3.2 – Refining gridded climate data products at Meteo Rwanda

- Complete tests on the new rainfall data (version 4) and integrate them to Meteo Rwanda Data Library and maprooms.
- Helping Meteo Rwanda with organizing, correcting and using its Radar and AWS data will continue by refining tools and remotely teaching Meteo Rwanda how to use those tools.

Activity 3.3– Develop different forecast products

- For seasonal forecast totals, the last two forecasts will be re-examined in the framework of ENACTS V4 during Q4.
- Progress towards prediction of daily rainfall data, onset date, number of rainy days, number of dry spells is intended in Q4.

Activity 3.4 – Develop climate service products and tools based on user and Meteo Rwanda demands in collaboration with project partners

- Work will continue on the Agriculture and Forecast Maprooms, including refinement via further collaboration with the Rwanda Agriculture Board.
- A water balance forecast maproom will be created based on CPT forecasts generated using historical water balance simulations.
- Tercile forecast derived from CPT outputs as requested by Meteo Rwanda staff.
- Official IDs will be used for admin IDs in Meteo Rwanda Maprooms as requested by GIS partner.

Activity 3.5 – Conduct operation research to improve understanding Rwanda’s climate and its forecasting

- The manuscript developed on the climatology of Rwanda’s temperature, rainfall, rainy day frequency, and dry spell frequency (all based on V3 ENACTS) will be submitted for publication in Q4.
- Research regarding the influence of ENSO, IOD and wind dynamics on rainfall and temperature over Rwanda will continue in Q4 with publication submission planned for submission in Q1/Q2 of 2018

Outcome 4: Climate Services Governance

Activity 2017 4.1.2 – Develop Terms of Reference for the Advisory Committee, including the development of sustainable national climate services governance process beyond the duration of the project. Briefing paper on case studies of climate services governance in other countries, and lessons to consider for Rwanda.

- A consultative workshop to develop the action plan for the National Framework for Climate Services will be held during the first week of December. The workshop will be facilitated and covered by the RCSA project. Details from this workshop will be reported in the next reporting period.
- Further progress on the governance structure paper is planned following sessions on the Africa Open Data Conference in Accra, Ghana in Q3.

Progress on Gender

A quantitative survey was carried out after the first year of PICSA activities. The survey, which was carried out in March 2017, was undertaken with 214 trained farmers (randomly selected) across the four districts. Survey respondents were asked about the content of their training and whether the various elements of the training had been useful in their planning and decision making. The majority of those who were trained reacted positively to the different tools and found them useful. There was little difference when respondents were split by gender. Results are reported in [Clarkson et al. \(2017\): Climate Services for Agriculture in Rwanda: Initial findings from PICSA monitoring and evaluation.](#)

Table: PICSA elements and their perceived usefulness.

PICSA element / tool	Respondents trained (n=214)	Trained respondents who found the element useful in their planning and decision making		
		All	Female	Male
Resource allocation maps	205 (96%)	200 (98%)	110 (96%)	90 (99%)
Historical climate information	211 (99%)	207 (98%)	114 (99%)	93 (98%)
Probabilities and risks	204 (95%)	199 (97%)	106 (96%)	93 (100%)
Crop and variety options	213 (100%)	209 (98%)	115 (97%)	94 (100%)
Livestock and livelihood options	209 (98%)	203 (97%)	111 (97%)	92 (98%)
Participatory budgets	191 (89%)	186 (97%)	101 (96%)	85 (99%)
Seasonal forecast	208 (97%)	202 (98%)	110 (96%)	92 (99%)
Short-term forecast	183 (86%)	181 (99%)	99 (100%)	82 (98%)

Coordination with Other USAID Programs and Partner Initiatives

This project leverages activities of different projects that have overlapping activities, including the CCAFS-led Climate Services for Africa (CSA) project, funded by USAID-ARF. The CSA project works with ICPAC (IGAD Climate Prediction and Applications Center, Nairobi) to expand the suite of products that it provides regionally for the agricultural sector, and embed capacity within ICPAC to build capacity of national meteorological services to meet the climate information needs of their agricultural sectors. The two projects have initiated joint planning, analyses and (in the case of growing season onset)

Maproom prototyping, to develop new tools for analysis of start of the rainfed growing season, and to monitor and predict impacts of drought on crop production through modeled soil water balance.

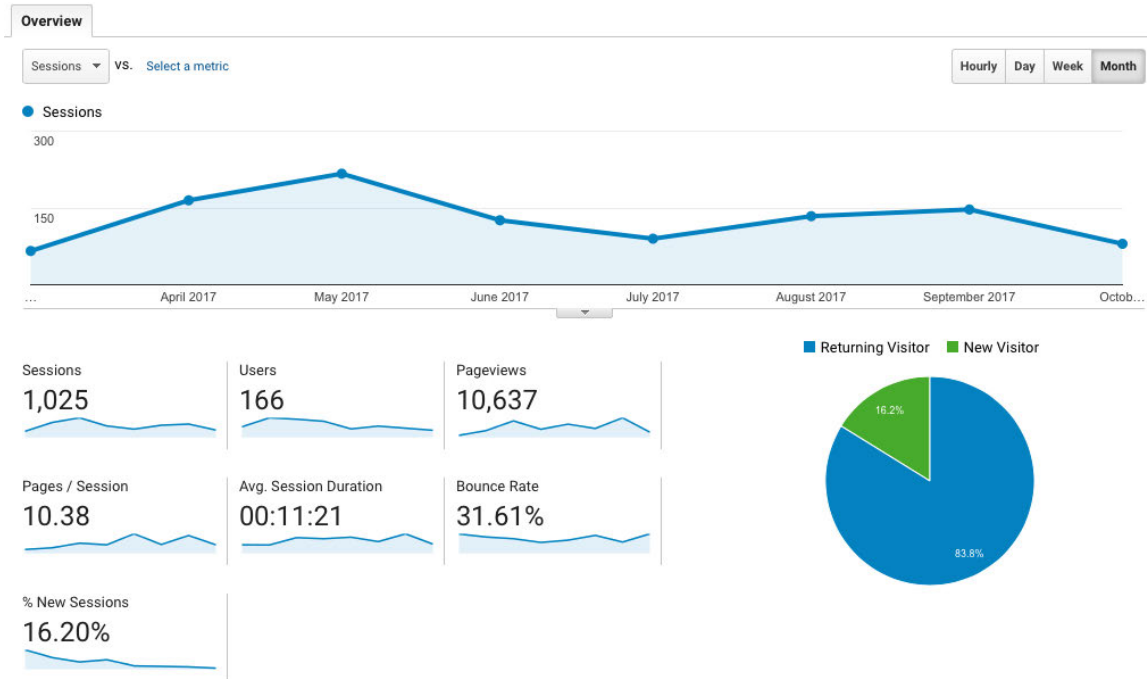
From August 23-25, the IGAD Climate Prediction & Applications Centre (ICPAC) hosted a workshop where participants reviewed current tools and offered recommendations for new climate tools for drought risk management in Eastern Africa. Many of the products featured in this workshop were those developed for Rwanda (particularly the Agriculture and Flexible Forecast maprooms). The workshop immediately followed the Forty Seventh Greater Horn of Africa Climate Outlook Forum (GHACOF47) in Zanzibar, Tanzania. The workshop was organized jointly by ICPAC, CSRD, IRI, CCAFS, and UK Met Office. Funding for some participants was provided by the CSA project, via ICPAC. More information on the workshop is here: <https://ccafs.cgiar.org/blog/developing-user-centric-climate-services-enhance-drought-resilience-africa#.Wd9-YkzMx-U>. Several participants from Rwanda participated, including two who were supported by the RCSA project. These individuals were: Gahigi Aimable (Rwanda Agricultural Board) and Gloriose Nsengiyumva (CIAT Rwanda). Ms. Nsengiyumva presented at the workshop on some of the tools being used in Rwanda regarding PICSA and other presentations also highlighted work in Rwanda being funded by this project, specifically on the agriculture maprooms and ENACTS Rwanda.

The project is also collaborating with the USAID-funded CISRI project, which selected the RCSA project as a site to test and pilot evaluation approaches for climate services. An evaluation survey of year 1 activities was organized in the 4 pilot sites of the project in August-September targeting 580 agricultural households.

The RCSA project is also partnering with the IFAD-funded Climate Resilient and Post-Harvest Agribusiness Support Project (PASP) project led by MINAGRI to rollout climate services through PICSA to the project mandate districts. PICSA training were conducted in four districts through cooperatives. Forty-eight representatives of 16 cooperatives (3 members per cooperative) were trained as training of trainers (ToTs). In total, ToTs trained 932 people from 16 cooperatives in four districts.

Appendix 1. Google Analytics for Rwanda Maprooms

Google analytics were installed on the Rwanda maprooms in early March 2017. The analytics look at both the Climate Data Library and the individual maprooms. Analysis shows that there are a total of 166 users who had 1,025 sessions, with 10,637 page views. A total of 70% of users were from Rwanda.



Appendix 3. Indicator Table

Indicator		Quarter	Target	Achievement	Note
11.1	Number of people trained in climate change adaptation supported by USG assistance	Q3	480	68	Due to a last minute disagreement with partners about using the graphs generated by Meteo Rwanda ENACTS for the PICSA training, PICSA training was only conducted for participants drawn from project partners. Therefore, training of farmer promoters was shifted to the following quarter to allow the project team to validate Meteo Rwanda ENACTS products before being used. Strategies were set to avoid any delays for the PICSA training and communications activities as planned.
		Q4	20,000	52,776	The Rwanda Climate Services for Agriculture project contracted NGOs partners to support the project in disseminating climate services information to farmers. These partners have helped to double the initial target.
11.5	Number of people supported by the USG to adapt to the effects of climate change	Q2	32,304	32,304	
		Q3	480	68	Due to a last minute disagreement with partners about using the graphs generated by Meteo Rwanda ENACTS for the PICSA training, PICSA training was only conducted for participants drawn from project partners. Therefore, training of farmer promoters was shifted to the following quarter to allow the project team to validate Meteo Rwanda ENACTS products before being used. Strategies were set to avoid any delays for the PICSA

					training and communications activities as planned.
		Q4	20,000	52,776	The Rwanda Climate Services for Agriculture project contracted NGOs partners to support the project in disseminating climate services information to farmers. These partners have helped to double the initial target.
11.6	Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance	Annual	9,374	2,447	